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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/373,544	08/13/1999	HIROSHI NAKATSU	829-522	2693

7590 07/17/2002
NIXON & VANDERHYE
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EXAMINER

KANG, DONGHEE

ART UNIT PAPER NUMBER

2811

DATE MAILED: 07/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/373,544

Applicant(s)

NAKATSU ET AL.

Examiner

Donghee Kang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11-16 is/are rejected.
- 7) ☒ Claim(s) 5-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Acknowledgment

1. Applicant's Amendment and Response to Paper No.9 has been entered and made of record. New claims 15-16 are added. Thus, claims 1-16 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **11 & 15** are rejected under 35 U.S.C. 102(b) as being anticipated by Fletcher et al. (US 5,008,718).

Fletcher discloses a light-emitting diode comprising (Fig.2):

a semiconductor substrate (20); and a layered structure comprising an AlGaInP type compound semiconductor material provided on the semiconductor substrate, the layered structure comprising:

a light emitting structure comprising of a pair of cladding layers (21 & 23) and an active layer (22) for emitting light provided between the pair of cladding layers (21 & 23) and a current diffusion layer (24) comprising an AlGaInP type compound semiconductor material9Col.3, lines 39-42), the current diffusion layer being lattice-mismatched with the light-emitting structure to obtain a prescribed level of resistive of the current diffusion layer. See also Col.3, lines 6 – 56 & Claim 8. Although, Fletcher does not say the

current diffusion layer being lattice-mismatched with the light-emitting structure, this feature is inherent because the current diffusion layer of Fletcher has a lower resistivity than a light-emitting structure (see claim 8).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **1, 3, 12-13, & 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fletcher et al. (US 5,008,718)

Fletcher discloses a light emitting diode comprising (Fig.2):

a semiconductor substrate (20); a layered structure comprising an AlGaInP type compound semiconductor material and provided on the semiconductor substrate,

wherein the layered structure comprises:

a light emitting structure composed of a pair of cladding layers (21 & 23) and an active layer (22) for emitting light provided between the pair of cladding layers; and a current diffusion layer (24) comprising an AlGaInP type material which is lattice mismatched with the light emitting structure. *See also Col.3, lines 6 – 56 & Claim 8.*

Fletcher et al. does not explicitly teach a lattice mismatch of current diffusion layer with respect to the light emitting structure is –1 % or smaller.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to minimize lattice mismatch of current diffusion layer with

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respect to the light emitting structure is $\leq 1\%$ or smaller in order to prohibit a high dislocation density which degrades an optical properties.

6. Claims **2, 4 & 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fletcher in view of Hosoba.

Regarding claims **2 & 14**, Fletcher teaches substantially the entire claimed structure, as applied to claims 1 & 11 explained above, except that the semiconductor substrate is inclined by 8° to 20° in a [011] direction with respect to a (100) plane thereof. However, Hosoba teaches the semiconductor substrate is inclined in a [011] direction with respect to a (100) plane thereof. Thus, it would have been obvious in the art at the time the invention was made to incorporate the teaching of Hosoba into Fletcher's device since when a AlGaInP mixed semiconductor material is grown on the surface of the substrate inclined in a [011] direction with respect to a (100) plane thereof, a super-lattice is not formed and light can be prevented from having a longer wavelength due to the super-lattice.

Neither Fletcher nor Hosoba teach the semiconductor is inclined by 8° to 20° . However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a plane direction and a slope of groove in device since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 4, Fletcher does not teach a composition of the current diffusion layer is expressed as $(Al_xGa_{1-x})_{1-y}In_yP$, and x is set in the range of 0.01 to 0.05 and y is set in the range of 0.01 to 0.3 in the composition. However, Hosoba teaches the current diffusion layer is expressed as $(Al_xGa_{1-x})_{1-y}In_yP$, and x is set in the range of 0 to 1 and y is set in the range of 0 to 1 in the composition, which are in the claimed range. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a composition of layer since it has held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skills in the art. *In re Aller*, 105 USPQ 233.

Allowable Subject Matter

7. Claims 5-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

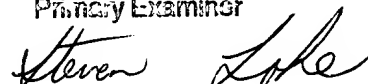
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Donghee Kang, Ph.D.
July 10, 2002

Steven Loke
Primary Examiner

A handwritten signature in cursive script, appearing to read "Steven Loke", written in black ink.